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## Heretofore Unpublished Illustrations of Coleophorid Genitalia, with Notes (Lepidoptera)

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It is a well-established fact that the safest way of identifying correctly the species of the family Coleophoridae is by a careful study of the genitalic characters of both sexes. The present author, in his various papers on the group, has adhered to this viewpoint and, wherever possible, has presented illustrations of these organs. In a recent review of the species of the Maritime Provinces of Canada, it has been noted that, in several instances, illustrations of such organs have been either entirely lacking or based on only a single sex. The main reason therefore for the present paper is to eliminate such gaps as far as our material allows and to give at the same time a complete bibliography of the species involved, with such biological details as might be considered of value. A few synonymous notes and a description of two species are also included.

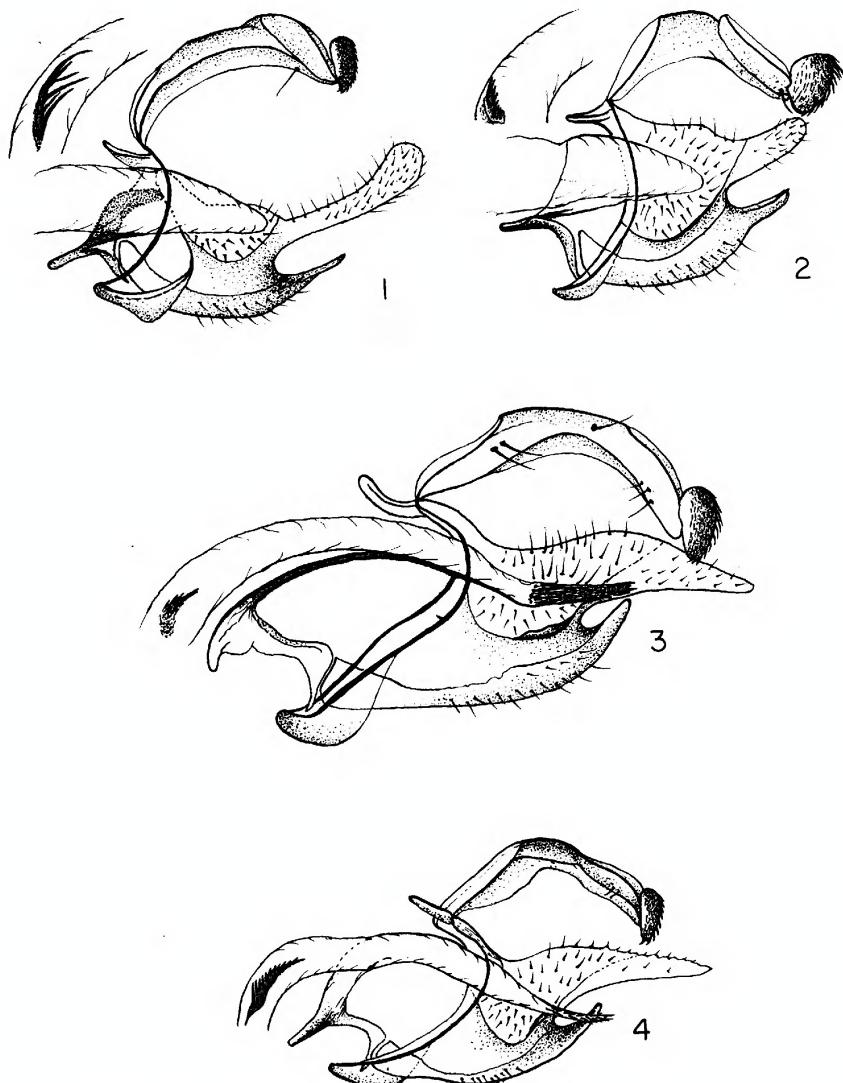
### *Coleophora kearfottella* Barnes and Busck

*Coleophora kearfottella* BARNES AND BUSCK, 1920, Contributions to the natural history of the Lepidoptera of North America, vol. 4, no. 3, p. 244. HEINRICH, 1924, in Forbes, Mem. Cornell Univ. Agr. Exp. Sta., no. 68, pp. 207, 213. McDUNNOUGH, 1942, Canadian Ent., vol. 74, p. 168.

The species was first recorded from the Maritime Provinces in 1942, the very distinctive cases having been found on willow at Brackley

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Figs. 1-4. Male genitalia of *Coleophora*. 1. *C. kearfottella* Barnes and Busck. 2. *C. cretaticostella* Clemens. 3. *C. viburniella* Clemens. 4. *C. peregrinaevorella* McDunnough.

Beach, Prince Edward Island. The sole known Nova Scotia record is based on a male specimen taken at light by Ferguson on July 8, 1950, in Cumberland County. The male genitalia of this specimen are figured; the female organ is still unknown.

*Coleophora cretaticostella* Clemens

*Coleophora cretaticostella* CLEMENS, 1860, Proc. Acad. Nat. Sci. Philadelphia, p. 5. STANTON, 1872, The Tineina of North America, p. 89. BUSCK, 1903, Proc. Ent. Soc. Washington, vol. 5, p. 192 (states type at Philadelphia). BRAUN, 1919, Ent. News, vol. 30, p. 111 (restricts to blackberry feeder). HEINRICH, 1924, in Forbes, Mem. Cornell Univ. Agr. Exp. Sta., no. 68, pp. 207, 213. McDUNNOUGH, 1946, Canadian Ent., vol. 78, p. 55.

Cases of this species are not uncommon in the Halifax area on blackberry in early spring. The larvae, however, are very subject to parasitism, and only a few adults have been secured from numerous cases collected over a period of several years. Both the male and female genitalic organs are depicted.

*Coleophora peregrinaevorella* McDunnough

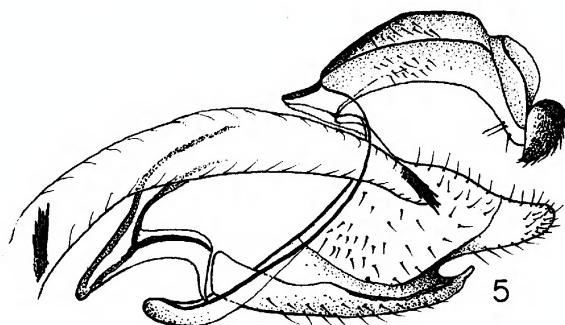
*Coleophora peregrinaevorella* McDUNNOUGH, 1954, Amer. Mus. Novitates, no. 1686, p. 3, figs. 1, 7A.

At the time of description only the female sex was available for study, and a figure of the genitalic organ was given. Since then a male has been bred from a case collected on *Comptonia* in the spring of 1954, producing an imago on July 24. Another male adult was collected around *Comptonia* on June 24, 1956. The male genitalia, a figure of which is given, bear considerable resemblance to those of *viburniella* Clemens, both in the terminal armature of the aedeagus and in the shape of the clasper.

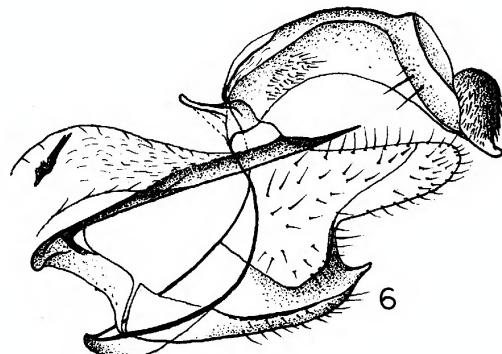
*Coleophora viburniella* Clemens

*Coleophora viburniella* CLEMENS, 1861, Proc. Ent. Soc. Philadelphia, vol. 1, p. 79. STANTON, 1872, The Tineina of North America, p. 167 (case only described). BRAUN, 1919, Ent. News, vol. 30, p. 110. HEINRICH, 1924, in Forbes, Mem. Cornell Univ. Agr. Exp. Sta., no. 68, pp. 208, 216. McDUNNOUGH, 1942, Canadian Ent., vol. 74, p. 107.

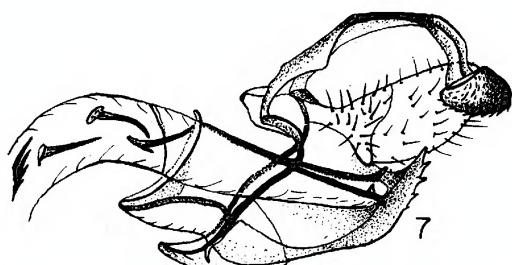
The very characteristic case found on *Viburnum prunifolium* formed the basis for the original description. The adult was described by Braun in 1919. Its occurrence in Nova Scotia was first reported by McDunnough in 1942 from cases found at both White Point Beach, Queens County, and Baddeck, Cape Breton, on *Viburnum cassinoides*. The species occurs generally throughout the Halifax area but is not at all common, and the cases are difficult to find. From such cases as have been secured in late summer a few males emerged in the following spring, but as yet the female is unknown. A figure of the male genitalia is given, and from its close resemblance to that of *peregrinae*



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6



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Figs. 5-7. Male genitalia of *Coleophora*. 5. *C. kalmiella* McDunnough. 6. *C. pruniella* Clemens. 7. *C. alticolella* Zeller.

*vorella* it may be deduced that the female genitalia will also be similar to those of this species (*vide* McDunnough, 1954, Amer. Mus. Novitates, no. 1686, p. 8, fig. 7A).

*Coleophora kalmiella* McDunnough

*Haploptilia kalmiella* McDUNNOUGH, 1936, Canadian Ent., vol. 68, pp. 53, 54, fig. 1 (male genitalia).

*Coleophora kalmiella*, McDUNNOUGH, "1945" [1946], Canadian Ent., vol. 77, p. 147, pl. fig. 4 (female genitalia); 1954, Amer. Mus. Novitates, no. 1686, p. 5 (larval note).

A figure is given of the male genitalia of a specimen captured at light on French Mountain, Cape Breton National Park. There are slight differences from the original figure of this organ, and the armature of the vesica is shown, a feature omitted in the original drawing. In certain years the cases are quite abundant on *Kalmia* in Point Pleasant Park, Halifax, and the species has also been taken at light at Pudsey Point, Cumberland County.

#### *Coleophora pruniella* Clemens

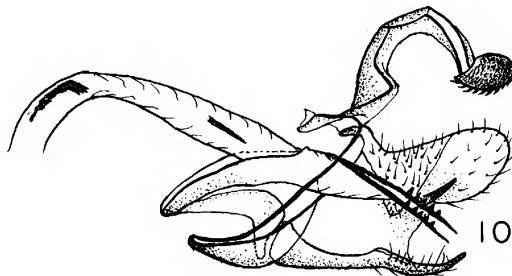
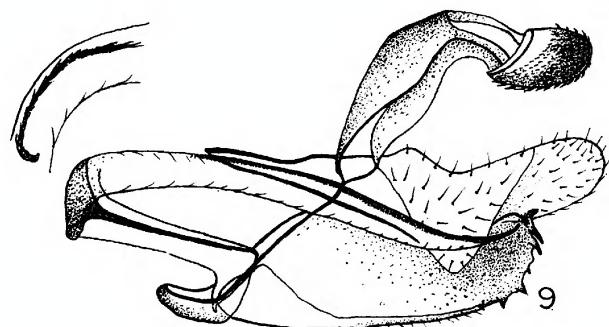
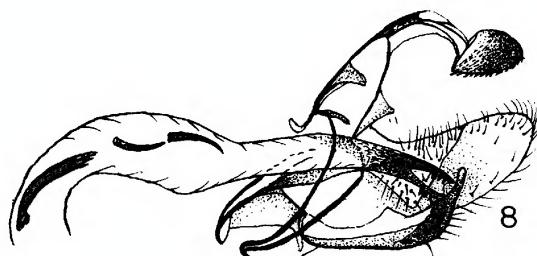
*Coleophora pruniella* CLEMENS, 1861, Proc. Ent. Soc. Philadelphia, vol. 1, p. 79. STAINTON, 1872, The Tineina of North America, p. 167 (case only described). BRAUN, 1914, Jour. Cincinnati Soc. Nat. Hist., vol. 21, p. 157 (imago described). HEINRICH, 1924, in Forbes, Mem. Cornell Univ. Agr. Exp. Sta., no. 68, pp. 206, 209. McDUNNOUGH, 1933, Canadian Ent., vol. 65, p. 163, pl. 10, fig. 2 (larval case); "1945" [1946], *ibid.*, vol. 77, p. 146, fig. 8 (female genitalia); 1946, *ibid.*, vol. 78, p. 55 (larval food plants).

The species occurs abundantly in Point Pleasant Park, Halifax, and has been bred from the characteristic holster cases found in the spring on *Betula*, *Alnus mollis*, *Amelanchier*, *Comptonia*, and *Salix fragilis*. At Peggy's Cove, Halifax County, the cases occurred on *Myrica gale* and were also very abundant on the same plant in 1956 at White Point Beach, Queens County. As no figure of the male genitalia has as yet been given, the organ is herewith illustrated. Attention is called to the single, long, terminal spine on the aedeagus and the peculiar shape of the apex of the gnathos which is glabrous and slightly upturned when viewed laterally.

#### *Coleophora alticolella* Zeller

*Coleophora alticolella* ZELLER, 1849, Linnaea Ent., vol. 4, p. 341. BRADLEY, 1955, Entomologist, vol. 88, p. 275, figs. 2, 4 (genitalia). McDUNNOUGH, 1957, Amer. Mus. Novitates, no. 1827, p. 3.

Figures of the male and female genitalia are given, based on the Mt. Washington material mentioned in the 1957 paper. The illustration of the male organ presents a lateral view, with the left clasper supposedly removed, while Bradley's figure shows the position with the clasps opened out. Both methods have their disadvantages. In the lateral view the structure of the transtilla and tegumen is obscured, but the relationship of the vinculum and proximal portion of the aedeagus is more clearly recognizable. The opening out of the claspers on the



Figs. 8-10. Male genitalia of *Coleophora*. 8. *C. sexdentatella*, new species, holotype. 9. *C. laurentella* McDunnough. 10. *C. dentiferoides*, new species, holotype.

other hand forces the aedeagus and vinculum into unnatural positions, although the transtilla and tegumen are better available for study.

*Coleophora laurentella* McDunnough

*Coleophora laurentella* McDUNNOUGH, 1944, Canadian Ent., vol. 76, p. 109, pl. 7, fig. 8 (female genitalia); 1946, *ibid.*, vol. 78, p. 61 (food plant).

The species occurs rarely in the Halifax area, and a few specimens have been bred from cases found on an *Aster* species, probably *nobilis*, in Point Pleasant Park.

A figure of the male genitalia is given which, as already noted, shows the close relationship to the genitalia of *asterophagella* McDunnough.

*Coleophora rosacella* Clemens

*Coleophora rosacella* CLEMENS, 1864, Proc. Ent. Soc. Philadelphia, vol. 2, p. 426. STANTON, 1872, The Tineina of North America, p. 251. BUSCK, 1903, Proc. Ent. Soc. Washington, vol. 5, p. 217 (location of type). HEINRICH, 1924, in Forbes, Mem. Cornell Univ. Agr. Exp. Sta., no. 68, pp. 206, 210. McDUNNOUGH, 1930, Trans. Roy. Soc. Canada, sect. 5, p. 66, pl. 2, fig. 3 (male genitalia); 1946, Canadian Ent., vol. 78, p. 62.

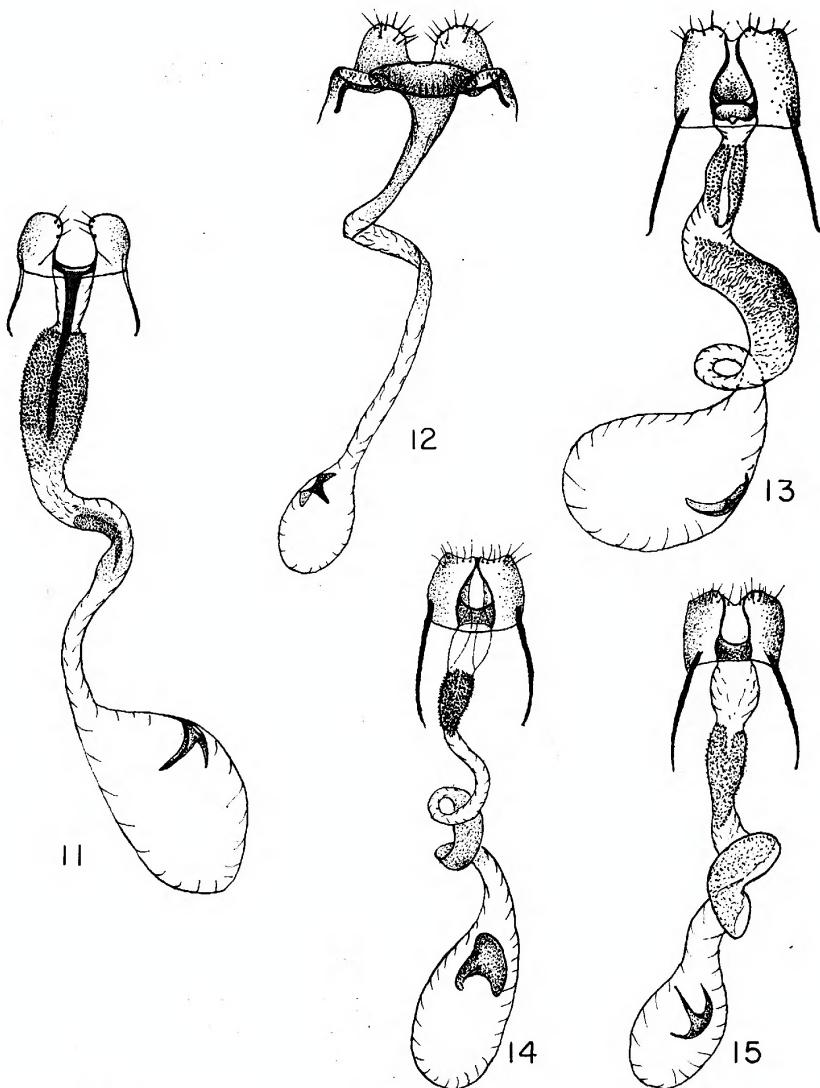
In late September the cases are not uncommon on wild rose in various sections of Point Pleasant Park, Halifax. At this time the larva is forming the final case, and its presence may be recognized by a narrow white strip along the edge of the leaf where the parenchym has been eaten away. This section is then detached from the leaf to form the new case, the old one being left adhering to the leaf. Feeding continues for a short time and is again resumed in the spring after hibernation. The mature case generally shows the slight protuberance on the ventral surface mentioned by Clemens; the apex is rather feebly trilobed; the imago appears in June.

Among the bred specimens a single female of *rosaevorella* was found which had emerged from a case which was evidently so similar to that of *rosacella* as to have escaped notice. The species appears to be rare in this region. A figure of the female genitalia of *rosacella* is given for comparison with the same organ in *rosaevorella* (McDunnough, 1946, Canadian Ent., vol. 78, p. 57, fig. 5). Attention is called to the large chitinized plate which more or less covers the ostium opening.

*Coleophora alnivorella* McDunnough

*Coleophora alnivorella* McDUNNOUGH, 1946, Canadian Ent., vol. 78, pp. 2, 10, fig. 6, pl. 1, fig. 4.

In the above paper mention was made of the difficulty of determination involving the European species *milvipennis* Zeller and *badiipennella* Duponchel. Thanks to the courtesy of Mr. J. E. Bradley of the British Museum (Natural History) and M. P. Viette of the Musée Na-



Figs. 11-15. Female genitalia of *Coleophora*. 11. *C. cretaticostella* Clemens. 12. *C. rosacella* Clemens. 13. *C. alticolella* Zeller. 14. *C. dentiferoides*, new species, paratype. 15. *C. sexdentatella*, new species, allotype.

tionale in Paris it has been possible for Bradley to examine the genitalia of the types of both species and arrive at the conclusion that Toll's treatment of these species was correct (1952, Eupistidae of Poland, p. 62). A biological race of *milvipennis* was described as *alnifoliae* by Barasch (1934, Deutsche Ent. Zeitschr., p. 36). Dr. E. M. Hering of the Berlin Zoological Museum has kindly furnished the

author with a pair of specimens of *milvipennis*, bred from birch, and a pair of *alnifoliae*, bred from *Alnus*, which agrees with Barasch's types. A comparison of the genitalia of *alnivorella* with those of both *alnifoliae* and *milvipennis* shows that they are practically identical in both sexes. In all probability *alnivorella* will fall to *alnifoliae* as a synonym, but until more detailed knowledge of the life history of our North American species is available the author prefers to leave the matter for the present in abeyance. The name might be retained for a geographical race, especially in view of the fact that many European workers consider that *alnifoliae* should be raised to specific rank (*vide* Benander, 1938, *Opuscula Ent.*, vol. 3, p. 115).

**Coleophora sexdentatella, new species**

Palpi thin, porrect or with third joint somewhat upturned, smoky outwardly, pale fawn inwardly, smoothly scaled, with a faint terminal tuft of hairs apically and ventrally on second joint; third joint about half of the length of the second one. Antennae thin, pale fawn, unbandied in the male, slightly ringed with brown in the female; basal joint weakly rough scaled. Primaries light fawn, the interspaces between the radial veins smoky brown, producing a somewhat strigate appearance in the terminal half of the wing. Secondaries and fringes of both wings smoky brown. Legs similar in color to primaries, unmarked. Expanse, 11 mm.

**MALE GENITALIA:** (Based on the holotype). Sacculus with the apical half strongly rounded dorsally and produced into a long process which projects over the ventral half of the clasper, terminating bluntly. Clasper broad, extending considerably beyond the apical section of the sacculus. Valvula well developed, roughly triangular, heavily covered with long, fine setae. Gnathos oval, when viewed laterally, projecting caudad. Aedeagus furnished in its distal section with two laterally compressed, chitinous rods, well separated and bent slightly downward, each furnished with a row of three small teeth, arising ventrally and very slightly subapically. Vesica armed with a proximal cluster of closely appressed cornuti, followed distally by two large, single spines, slightly curved.

**FEMALE GENITALIA:** (Based on the allotype). Genital plate almost square, the caudolateral edges somewhat rounded; lobes widely separated; the central section of the caudal edge with a slight, V-shaped excavation. Ostium broad, rounded, raised somewhat above the level of the genital plate and situated near its cephalic margin, chitinized as far as this edge. The ductus bursae broad, roundedly expanded in its first, short, membranous section, followed by a somewhat longer

and narrowed spiculate section, then again membranous, forming a semiconvolution which is feebly spiculate, and continuing shortly to join the membranous bursa which is oval and furnished with a long, fine, spined signum arising from a broad lunate base.

**TYPE MATERIAL:** Holotype, male, Mt. Uniacke, Nova Scotia (D. Ferguson), July 21, 1956. Allotype, female, same data. Paratype, one male, same data. The holotype and allotype are deposited in the Canadian National Collection. The paratype is in the author's collection.

**REMARKS:** The type material was taken at light along a wood road. To judge by the aedeagus and the armature of the vesica, the species is possibly related to both *contrariella* McDunnough and *bispinatella* McDunnough, of which only the male sex is known. In color and maculation of the primaries it can scarcely be separated from these two species.

#### *Coleophora dentiferoides*, new species

Palpi pale whitish, thin, slightly upturned; second joint with only slight trace of ventro-apical tuft; third joint short. Antennae pale, with no traces of annulation. Head and thorax pale creamy. Primaries pale fawn, the interspaces between the veins faintly darker, giving a slight, longitudinal, striated appearance. Fringes pale. Secondaries pale smoky, with paler fringes. Legs pale fawn. Expanse, 10 mm.

**MALE GENITALIA:** Sacculus with the ventral margin produced into a long, narrow process, upturned apically, somewhat similar to that of *glissandella* (*vide* McDunnough, 1942, Canadian Ent., vol. 74, p. 169, pl. 13, fig. 1) There is also a pointed, dorsal process projecting, as in this species, over the ventral portion of the clasper, which is broad and extends well beyond the apex of the sacculus. The most characteristic feature is found in the aedeagus, the terminal half of which is formed by two narrow, chitinous rods, bending downward, with their apices drawn out to points and reaching almost to the ends of the ventral sacculus projections. Each rod shows dorsally a series of five small teeth, starting slightly subapically and extending backward, the teeth of the right rod slightly larger than those of the left one. Vesica armed with a proximal cluster of closely appressed, short cornuti followed caudad by a single, long, fine spine. Valvula well developed, triangular, covered sparsely with long hairs. Gnathos oval, projected caudad.

**FEMALE GENITALIA:** Extremely close to those of the preceding species, *sexdentatella*. In the genital plate the edges of the two lobes practically

meet at the mediocaudal margin and then separate obliquely. The raised ostium is much as in *sexdentatella*; its situation on the plate is slightly more caudad than in this species but it shows the same rounded shape and is well chitinized as far as the cephalic edge. The initial portion of the ductus bursae shows the same rounded expansion as in *sexdentatella* and is followed by a narrowed, spiculate section. The following thin, somewhat twisted, membranous section is longer than in *sexdentatella* before reaching the feebly spiculate section from which the ductus seminalis arises. This section is quite thin, twisted, and followed by a slightly expanded membranous section before entering the bursa which is small, oval, and entirely membranous. The signum is represented by a spine arising from a somewhat lunate plate, both sections smaller than in *sexdentatella*.

**TYPE MATERIAL:** Holotype, male, White Point Beach, Queens County, Nova Scotia, June 4, 1957 (bred from *Juncus militaris*). Allotype, female, same data as holotype but July 1. Paratype, one female, same data but July 3. The types remain in the author's collection for the present.

**LARVAL CASE:** Very characteristic, the basal portion being formed by the entire seed capsule, a feature found only in *fagicorticella* Chambers, as far as North American species are concerned. When mature the light brown case proper projects beyond the basal section for a considerable distance, terminating in a trilobed apex. The whole case is 3–4 mm. long, much longer than that of *fagicorticella* and very similar to that of the European *galactaula* as figured by Benander (1939, Opuscula Ent., p. 119, pl. 8, fig. 23). Mature cases project considerably beyond the seed heads and are easily spotted. They were found quite commonly at White Point Beach, Queens County, in early September on *Juncus militaris*, a rush that grows along the shore of the lake near the lodge and is quite plentiful in the southeast section.

**REMARKS:** In spite of the fact that in 1956 a number of cases were secured, only a single male and two females emerged in the following spring. This was partly due to heavy parasitism by a chalcid and to the usual inevitable mortality during hibernation. To a certain extent it might be attributed to the fact that the larvae were not fully fed when the closing of the lodge necessitated my return to Halifax, where no *Juncus militaris* could be secured for further feeding and other species were refused by the larvae.

